



Objectives of a Human Mission to a NEO: Planetary Defense Considerations

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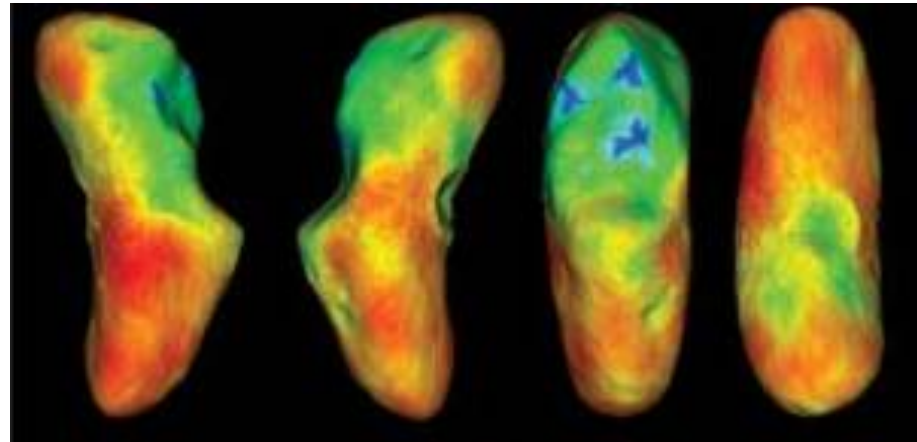
Opinion of the Author.
Not a position of the USAF or DOD.

Planetary Defense: Objectives & Requirements

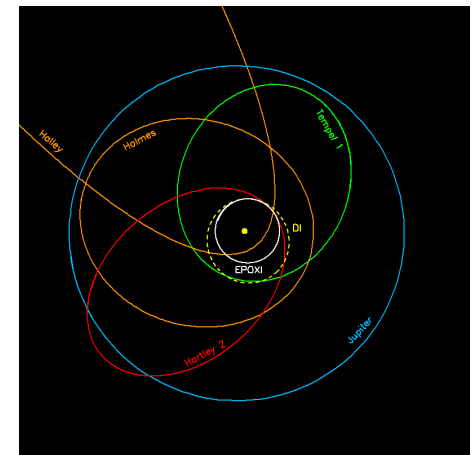


- Advance the state of preparedness to protect planet Earth (its citizens, civilization, property and biosphere) from a future asteroid or comet strike

Planetary Defense: Objectives & Requirements



- Better understand the composition and dynamics of NEO objects in order to:
- Refine methods of “pushing” the NEO
 - Select appropriate method
 - Model potential methods
- Conduct better mission planning



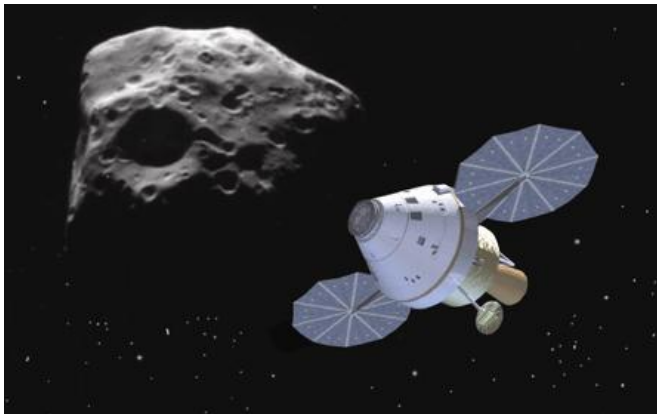
What is hard for unmanned?



While a manned mission can *also* survey the asteroid for shape, surface composition, gravity / EM field model, etc., it is likely to have an advantage in:

- Innovation and adaptation to unknowns & unanticipated phenomena
- Recovery from errors
- Multiple protocols in multiple locations with a faster OODA loop and opportune site selection
- Docking, Drilling, Sample Collection & sub-surface exploration....and...compelling public interest

Human Mission for Planetary Defense “Bare Minimum Requirements”

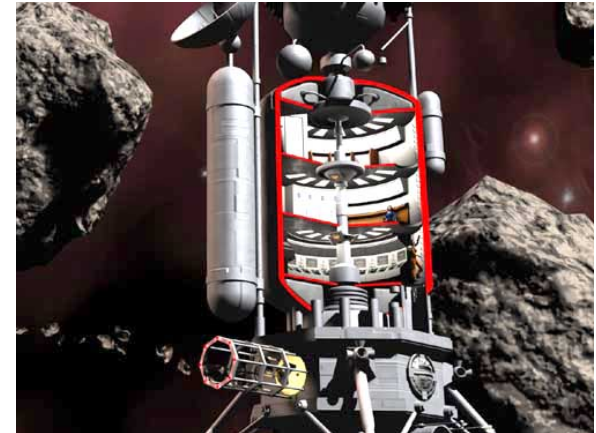
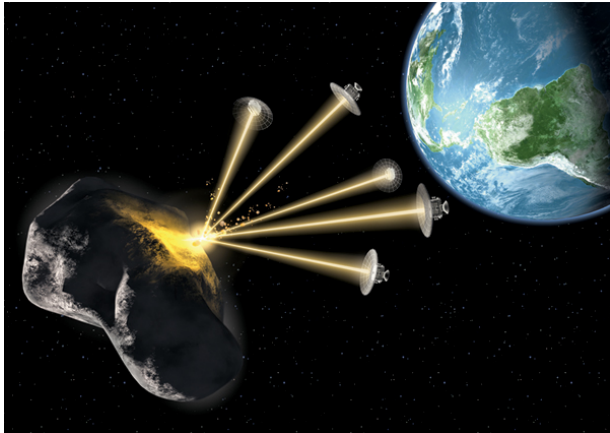


Humans allow multiple protocols in multiple locations

- Transponder / Reflector emplacement for precise tracking
- Proximity Ops & Docking
- Seismic Survey
- Drilling & Attaching
- Sample Return



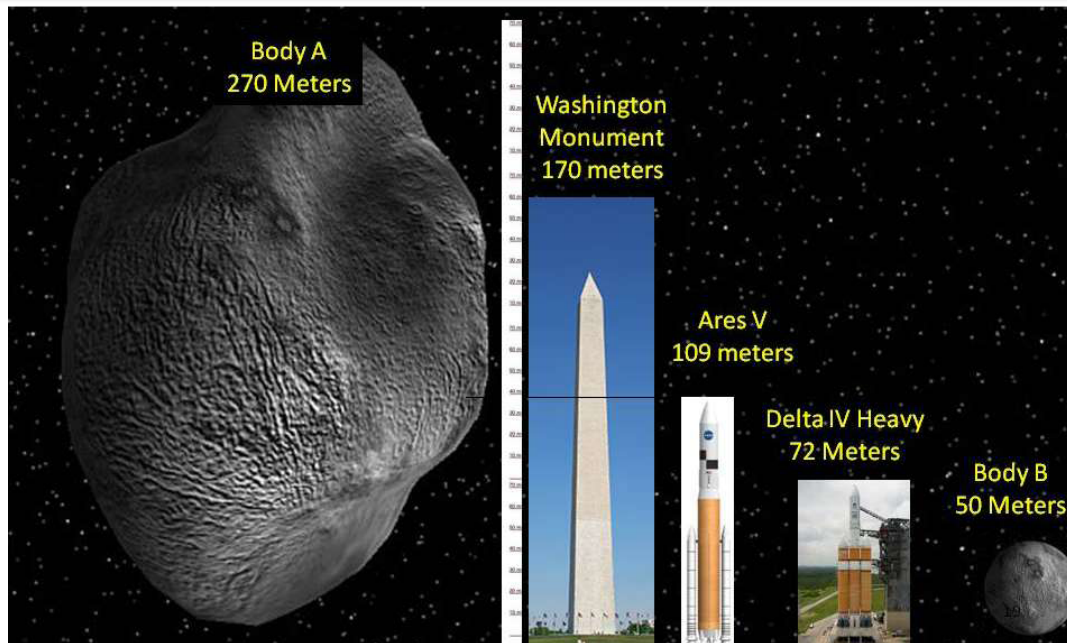
Planetary Defense: Objectives & Requirements



Better understand the maturity, 'workability' and complications of proposed methods:

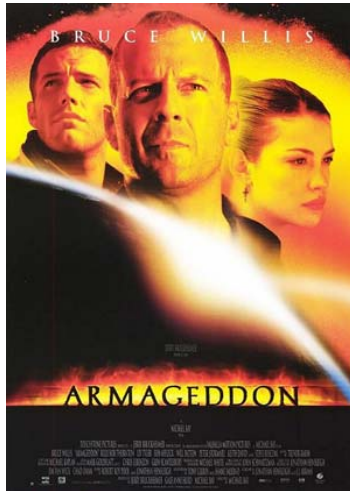
- Concentrated light (fouling, off-gassing)
- Kinetic Impact
- Subsurface emplacement of physics packages
- Survival of device packaging
- Station-Keeping / Thrusting (Gravity Tractor)

Targets



- Ideal target would be large & “rich”
 - Heterogeneous composition
 - Rubble Pile
 - Perhaps binary
- An actual PHA or a very similar to a high risk PHA

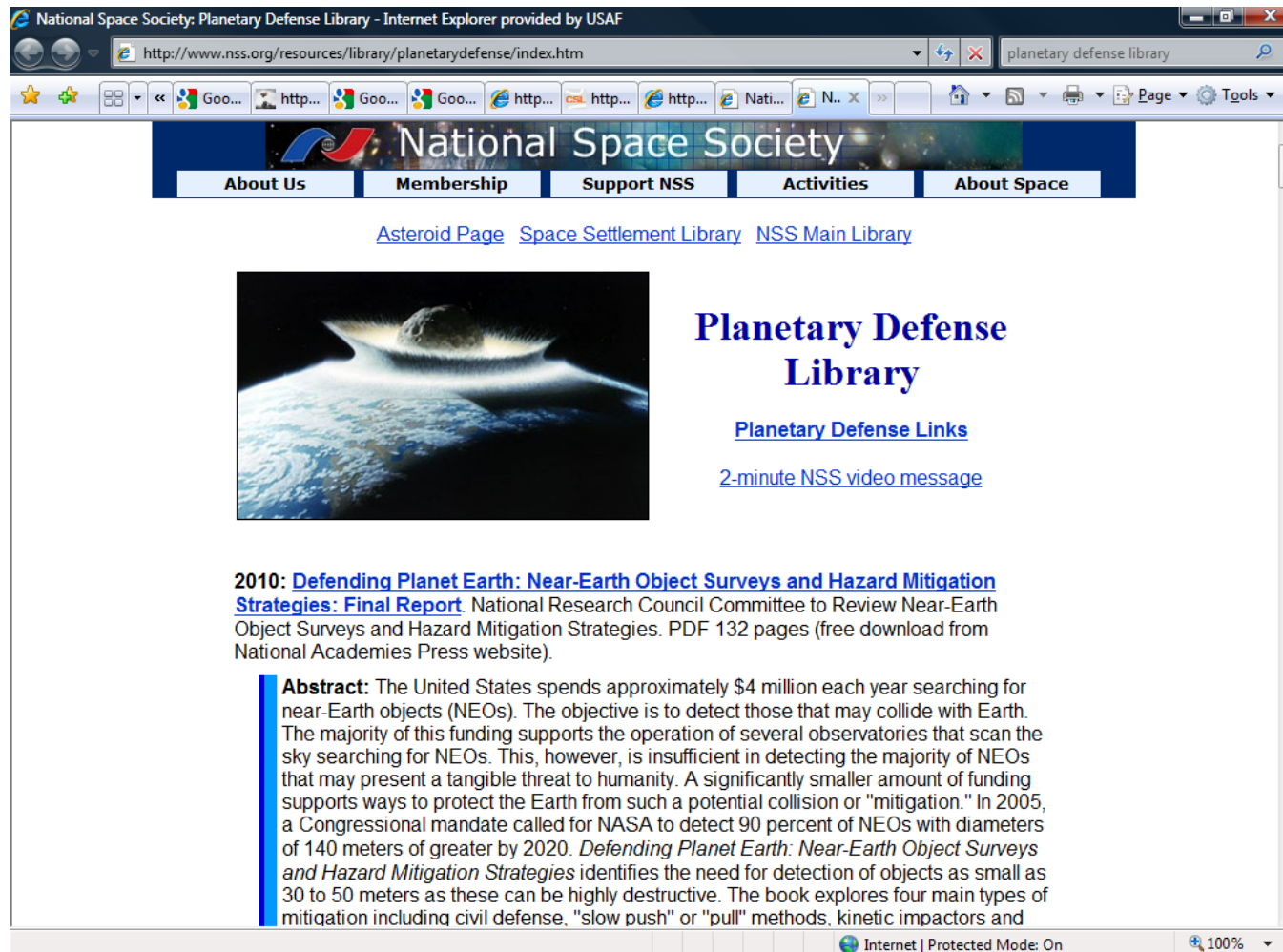
Awareness of the threat is a component of success:



2002	2005	Space Goal
32%	26%	Build satellites in Earth orbit to collect solar energy to beam to utilities on Earth
23%	17%	Develop the technology to deflect asteroids or comets that might destroy the Earth
6%	10%	Send humans to Mars
2%	7%	Search for life on other planets
6%	7%	Send unmanned robots to space
5%	4%	Build a base on the moon for humans to use for exploration of the moon
3%	3%	Develop a passenger rocket to send humans into space
1%	2%	None of the above, we should stop spending money on space
13%	18%	No Opinion
1%	2%	None of the above

- Capitalize on public interest and excitement and relevance to a common concern: survival
- Capitalize on publicity to advance the profile and organizational readiness to respond

Planetary Defense Library



- <http://www.nss.org/resources/library/planetarydefense/index.htm>